THE CRANE CORNER

NAVAL FACILITIES ENGINEERING COMMAND

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Inside This Issue

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A WORD FROM TOPSIDE

Sam Bevins

Our FY01 second quarter accident summary (see page 4) added a special note related to mobile crane accidents. I'd like to expand on this issue. Mobile cranes are indispensable in supporting the Navy's varied missions. Their mobility and versatility are the attributes that hallmark their great value. However, these same attributes make this type of crane much more hazardous to operate than any other type of crane in our inventory. The quarterly accident summary points this out. Mobile cranes make up only 8 percent of our total inventory, yet they were involved in 32 percent of our crane accidents reported since 1997. And the trend is worsening. In the past 18 months, they have been involved in almost 40 percent of reported accidents.

My staff reviewed the accidents reported since 1997 and came up with the following common mobile crane accidents: There were 60 collisions. Of these, 21 were load collisions including 9 where the load struck the crane itself. Also, there were 13 reports of damage from one crane component striking another crane component. There were 30 two-block accidents. There were 27 overloads, including 15 crane overloads occurring during load tests. There were 23 dropped loads. There were 21 accidents due to improper assembly of ancillary equipment. There were 15 instances of damaged wire rope due to side pulls and wire rope jumping sheaves. Wire rope damage due to mis-spooling of the wire rope on the drum was reported 14 times. Many of these types of accidents are unique or almost unique to mobile cranes.

Surprisingly, most mobile crane accidents occur with no load on the hook (i.e., while traveling, setting up the crane, assembling ancillary devices, two-block accidents while telescoping or lowering the boom, attaching hook tie-backs, spooling the wire rope on the drum too quickly with an empty hook). More than any other type of crane, it is extremely important for the crane team to remain alert and attentive during every mobile crane operation, even during the above noted non-lift evolutions.

Due to their configuration, one crane component can easily strike another component. The boom can be rotated into the cab or exhaust system. The hook blocks can be swung into the boom, outriggers, or other crane parts at close-in radii. At the same time suspended loads can easily be swung into crane components. If not accounted

for, boom deflections can result in loads swinging out beyond allowable radius. Operators and other crane team personnel must be alert to these hazards unique to mobile cranes.

Numerous accidents were the result of the operator inadvertently operating the incorrect lever. Activities may have numerous different models of mobile cranes in their inventories. Supervisors must ensure the operator is thoroughly familiar with the operating characteristics of each crane that he/she may be assigned to operate.

The number of overloads during load tests indicates a lack of complete knowledge of mobile crane load test procedures. Proper calculation of test loads and a complete understanding of the crane's load chart are essential. My staff is currently working with PWC San Diego on an instructional video on the testing of telescoping boom mobile cranes. The video should be available early next year.

There are still far too many two-block accidents. Activities need to review the special requirements of NAVFAC P-307 related to hoist limit switches and ensure all applicable safety procedures are in place and understood by crane teams.

Mobile crane operation is the number one area where a greater attention to safety will have a high payback. Every aspect of operation has its unique hazards. The consequences of even the slightest inattention can be catastrophic. We see this all too often. I urge weight handling managers at all activities with mobile cranes to share these observations and lessons learned with your crane teams. We would be glad to share any additional observations, lessons learned, and improved mobile crane practices you may have in future Crane Corner issues.

SHARE YOUR SUCCESS

We are always in need of articles from the field. Please share your "sea stories" with Marge Firn, (610) 595-0905, fax (610) 595-0747, or e-mail firnmp@efdnorth.navfac.navy.mil.

WEIGHT HANDLING EQUIPMENT CONFERENCE

Bruce Tingen

The Navy Crane Center (NCC) is planning to host a weight handling equipment (WHE) conference in spring 2002. The specific dates and location are yet to be determined. The length of the conference will be 2-3 days. The purpose of the conference is to share WHE improvement practices and safety initiatives as well as to discuss common issues with the goal of further improvements in WHE safety, maintenance management, engineering and operations.

All Navy shore activities and shore based operational units with WHE are invited to attend and participate. The basic format of the conference will be presentations and selected working group meetings. Action items from the working group meetings will be assigned for subsequent review and resolution.

For planning purposes, request interested activities respond with approximate number of attendees. Also indicate if interested in making presentation on initiatives or issues of particular interest. Proposed agenda items (may include background, discussion, and proposals for improvement) are also welcome.

Interested parties should respond by 31 July 2001 to Bruce Tingen phone (610) 595-0505 or DSN 443-0505, fax (610) 595-0812 or DSN 443-0812, or e-mail tingendb@ncc.navfac.navy.mil.

HAVE YOU HEARD ABOUT?

Igor Lissy

Load indicating bolts (and custom designed fasteners) are available to provide continuous in-service monitoring of their clamping force. Bolt shank elongation sensing devices are used to obtain the bolt tension with an accuracy of +/-6% as standard or +/-3% on special order. The devices are rugged, with all exposed components made of plated or stainless steel and sealed to withstand harsh environments, even submersion, from -40º Fahrenheit to +400º Fahrenheit. Bolts are available in standard sizes from 1/2 to 3-1/4 inches in diameter of any length. Each bolt is calibrated and tested to its proof load. The small holes drilled for installation of the elongation sensing devices do not compromise the integrity of the bolts – testing to destruction confirms that the failure site remains at the threads.

FIGURE 1

The bolts are offered in two styles - dial (figure 1) and pin/disc (figure 2). In the dial bolts, the bolt elongation is converted directly into percentage of the proof load and displayed on a multi-colored dial. The dial display can be monitored visually as the bolt is tensioned. For the pin/disc bolts, a portable (battery powered) electronic transducer/monitor is used to measure the distance between the top of the pin and the datum disc surface. The depth of the pin recess (bolt elongation) is converted to clamp load, which is displayed in a digital format on the monitor. The transducer/monitor can be coupled to a power-tightening tool set to shut off the power at a pre-determined clamp load. The transducer/monitor can be used for data gathering and storage. The system can be designed to monitor the performance of any number of bolts simultaneously with the results displayed and stored for permanent record keeping.

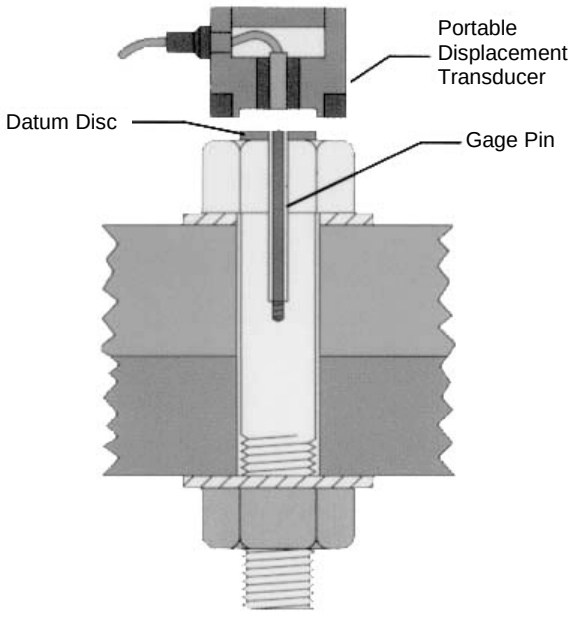


FIGURE 2

A few load indicating bolts installed in sensitive or representative locations can serve as monitors of the condition of the particular joint, bolt group, or component installation.

Contact Igor Lissy, (610) 595-0924 or DSN 443-9024 for additional information.

SECOND QUARTER FY01 ACCIDENT REPORT

Wes Hill

The Navy Crane Center (NCC) disseminates crane accident lessons learned to prevent repeat accidents and improve overall crane safety. NAVFAC P-307 requires commands to submit a final, complete accident report (including corrective/preventive actions) to NCC within 30 days regardless of severity or type. In addition, contracting officers are required to forward reports of contractor crane accidents involving fatalities, in-patient hospitalization, overturned cranes, collapsed booms, or other major crane or property damage to NCC within 30 days. As can be seen below, mobile cranes were involved in the majority of the accidents identified. Although they comprise only 8 percent of the Navy's crane inventory, they are involved in almost 40 percent of all WHE accidents reported, including the majority of serious accidents. In the second quarter of FY01, Navy shore activities reported 44 crane accidents. Serious accidents this quarter included one personal injury, one overturned crane, four dropped loads, five overloads, and four two-blockings.

PERSONAL INJURY

- Accident: While lifting a load through a ship's hatch, the rigger-in-charge and another rigger tried to hold the four lever-operated hoists that were used in the rigging configuration away from the hatch fairing edge to prevent them from getting caught. As the load was being hoisted, one of the hoist hooks got caught on the fairing edge. The hook came under strain and snapped back toward the rigger-in-charge and struck him on the forearm. In addition, the hoist was damaged and removed from service.
- Lesson Learned: Assess all potential hazards and identify effective methods for controlling and minimizing risks prior to making the lift. This was an injury that could have easily been prevented if prior risk assessment was conducted and effective controls were implemented.

OVERTURNED CRANE

- Accident: A 15-ton capacity mobile crane overturned while traveling with a 1/2-ton load on the hook. The operator picked up the load and started backing up the crane when the right rear tire dropped into a shallow, culvert ditch. The crane rolled over onto its side. The operator was not injured. The ground was grass covered and the ditch was obscured by overgrown grass.
- Lesson Learned: Prior to traveling a mobile crane on any unpaved surfaces, whether carrying a load or not, it is extremely important to thoroughly inspect the intended course of travel for uneven conditions and unstable ground.

DROPPED LOADS

- Accident: A hydraulic boom mobile crane operator was positioning a shore power cable device for the removal of a power cable when he mistakenly pushed the boom up lever instead of the hoist up lever. This caused the shore power cable to fall into the bay.
- Lesson Learned: Operators shall always maintain a high level of concentration while operating the crane. Take the time to ensure the correct operating lever is engaged.

- Accident: A mobile crane was removing a shore power cable when a ship crew member removed the holdback line on the ship prematurely. This allowed the cable to fall into the bay and caused damage to the ship's handrail.
- Lesson Learned: All members of the crane team, including ship's personnel that are involved in the operation, shall be thoroughly briefed on their duties and responsibilities prior to commencing with the operation.

- Accident: A mobile crane lost control of the load when both the boom hoist brake and the boom hoist clutch failed. The crane operator hoisted the load just high enough to clear a skid, raised the boom slightly,

and then returned the boom hoist controller to the neutral position. As the operator was rotating the crane, the boom hoist brake slipped and the boom started to lower. The operator then attempted to raise the boom; however, the boom slipped through the clutch and the boom continued to lower until the load rested on the ocean floor.

- Lessons Learned: There was considerable rain that day and there were leaks in the machinery house roof that permitted water to penetrate the brakes and clutches. The crane team and the activity were not sufficiently sensitive to these conditions. Wet conditions call for increased awareness of brake and clutch capabilities. In addition, the operator did not follow the OEM's recommended operating procedures, which state, "Keep boom hoist pawl engaged at all times except when lowering the boom. This device is a reserve safety feature to cover possibility of loss of hoist brake or clutch action." NAVFAC P-307 states, "Crane operators shall read, thoroughly understand, and comply with all procedures, safety instructions, and precautions in the OEM's operation manual." The activity included the OEM's requirement in a standard operating procedure; however, the operator was not present at the briefing that discussed this procedure. There were no signs in the operator's cab alerting the operator to the necessity of keeping the boom pawl engaged. Finally, activities need to be sensitive to apparently minor deficiencies such as the leaky machinery house roof. Inspectors and maintenance personnel need to be alert to potential water intrusion into load bearing and load controlling components and safety devices and make repairs expeditiously.

OVERLOADS

- Accident: A mobile crane was hoisting a test load weighing approximately 24,000 pounds when the weight of the load caused the boom to deflect. This deflection caused the load to move outside of the load chart radius for the load being hoisted.
- Lesson Learned: The crane team shall always ensure the load stays inside the OEM's lifting radius as annotated on the crane's load chart. Whenever possible, lift the load sufficiently within the allowable radius to allow for boom deflection and possible outward swinging of the load.

- Accident: When the headache ball weight was not included as part of the load deductions, a mobile crane was inadvertently overloaded during a stability load test over the rear.
- Lesson Learned: Test directors must ensure the correct deductions are taken into account prior to performing load tests.

- Accident: An operator preparing to load test a hoist on a barge used a 1,250-pound capacity jib crane to transfer the 2000-pound test weight from the pier to the barge. The jib crane had been administratively down-rated due to the condition of the pier.
- Lesson Learned: Operators shall always verify the crane's certified hoisting capacity prior to any lifting evolution.

- Accident: During a lift of a deck section from a ship with a portal crane, a load indicating device (LID) was overloaded. The lifting sketch, called for a 100,000-pound capacity LID to be used in the hoisting configuration. A 50,000-pound capacity LID was used instead.
- Lesson Learned: The rigger-in-charge shall ensure that the prescribed gear is used prior to making a lift.

- Accident: A category 4 mobile crane was overloaded when it was used to off load a pallet of electrical wire weighing approximately 660 pounds. The load was hoisted over the crane cab and crane front with stabilizers partially extended. The crane was not certified for over the cab or front lifting.
- Lesson Learned: In addition to being thoroughly familiar with a crane's operational characteristics, operators must be familiar with the configuration limits of the crane's certification.

TWO-BLOCKINGS

- Accident: While preparing for travel after concluding a practical performance test, the operator two-blocked the crane. The operator had to use the bypass key to raise both the main and whip blocks into their limit switches to ensure hook ground clearance prior to placing the boom in the cradle. During this maneuver, the operator was focusing on the boom point and failed to follow the rigger-in-charge's signal to stop. Upon realizing that the stop signal was given, the operator immediately tried to stop, but inadvertently operated the boom extension control. This caused the whip hook to make contact with the rooster sheave wire rope keeper bracket.
- Lesson Learned: During the operation of the crane, the operator shall follow the direction of the rigger-in-charge.

- Accident: During the off-loading of test weights from a trailer, a bridge crane was two-blocked. The test director warned the rigger-in- charge that the hook block was approaching the maximum height of the crane and was close to the limit switch when the test weights were being lifted off the trailer. This was due to the length of the slings being used. The rigger-in-charge did not heed the warning of the test director and continued to give the hoist-up signal to the operator, which resulted in the two-blocking.
- Lesson Learned: This lift was not properly planned. All potential hazards were not foreseen and discussed prior to the lift. Proper risk management was not applied. In addition, if anyone involved in the operation foresees a pending accident, he/she should indicate to the operator to stop operation.

- Accident: An operator trainee, on his first day of crane operation, two-blocked a mobile crane during familiarization training. The signalman gave the operator the signal to lower the whip line; instead the operator raised the whip line causing the two-blocking.
- Lesson Learned: Instructors need to provide close supervision of first-time operators to ensure the safety of the operation is not jeopardized.

Serious crane accidents are still occurring and human error (e.g., inattention to detail) is the primary factor. Weight handling program managers and safety officials are encouraged to consider the potential risk of accidents similar to those highlighted above occurring at your activity and apply the lessons learned to prevent similar accidents. Greater focus on mobile crane operation safety, hazard analysis, risk mitigation, and accident prevention should significantly reduce both the numbers and severity of Navy WHE accidents. OPNAVINST 3500.39, *Operational Risk Management*, prescribes methods for assessing hazards and controlling and minimizing risks in hazardous operations. Activities should incorporate these principles into both training and day-to-day weight handling operations.

To order crane accident prevention lessons learned videos contact Carolann Cosella (610) 595-0903 or DSN 443-0505.

Our point of contact for accident reports is Wes Hill (610) 595-0948 or DSN 443-0505, fax (610) 595-0747, or hillwx@efdnorth.navfac.navy.mil.

60-TON ROUGH TERRAIN TRUCK CRANE - STEERING FAILURE

During normal transiting from a job site at a Navy facility a couple of months ago, the two top mounting bolts on the cylinder mounting yoke on a 60-ton rough terrain truck crane fractured due to fatigue causing the yoke bracket to shear resulting a loss of steering control in the front axle. The 60-ton rough terrain truck crane recently had its hydraulics rebuilt. Investigation of the mishap revealed that the hydraulic pressure settings were incorrect and that the axle stops were not in the proper location, causing the failure of the two mounting bolts when too much hydraulic pressure repeatedly pushed the stop against another part on the axle causing the mounting bolts to fracture over time causing the yoke bracket to shear.

LESSONS LEARNED

When rebuilding a hydraulic system on a crane, contact the local distributor for the maintenance manual that contains the proper hydraulic pressure settings and the correct locations for the axle stops. In addition, check with the distributor for any service bulletins that may have been issued for that crane. ■

P-307 QUESTIONS & INTERPRETATIONS

John Hancher

Question: NAVFAC P-307 specifies certain requirements for contractor-operated cranes entering naval activities. These requirements ensure equipment and personnel safety. Contractor vehicles mounted with category 3 or 4 cranes entering the activity for delivery or other non-lifting purposes must comply with extensive and time-consuming requirements even though the equipment will not be used for lifting. Can we waive the requirements when the equipment will not be used for lifting if a statement of crane non-use is provided?

Answer: Contractor cranes that enter the facility for purposes other than lifting and handling are excluded from the requirements of NAVFAC P-307 provided that the contractor furnishes a statement that the attached crane will not be utilized for any lifting purposes.

Question: NAVFAC P-307, paragraph 2.2.1, states, "Each activity shall augment the specifications noted above with specification data sheets. These shall contain all guidance and technical information needed by inspectors in checking for wear, adjustments, setting, and tolerances during inspection. This information shall be extracted from OEM's technical manuals, maintenance experience, and other authoritative technical sources." NAVFAC P-307, paragraph 4.4.4 states, "Establishing brake settings and tolerances outside of OEM limits (or where the OEM does not provide a setting tolerance) for smooth stopping of travel and rotate drives is a locally approvable alteration. For hoist brakes . . . setting adjustments outside the OEM limits . . . constitutes an alteration requiring Navy Crane Center approval."

Basic brake setting criteria (set points for air gap, constant torque spring length, and minimum lining/disc thickness) are typically available from the brake OEM; however, adjustment criteria (set point tolerances and adjustable torque spring settings) are rarely defined by the brake OEM since these settings are application dependent. Lining/disc wear can change these brake settings and requires that operating limits be defined. Ultimately, establishing individual brake specification data sheets requires a combination of both OEM data and locally acquired data determined by brake testing performed to engineered procedures.

Our current brake inventory consists of about 400 independent devices, all of which will require an alteration by the current language in NAVFAC P-307, paragraph 4.4.4. (Note: Prior issues of NAVFAC P-307 did not require alterations for locally developed tolerances, as applied to OEM set points, and this information probably was not documented in the past, with alterations, by most activities.) Our WHE Engineering is currently developing separate specification data sheets for each brake that include both OEM provided data and locally developed data resulting from tests conducted on each individual brake. Brake testing is being conducted by

our WHE Inspections/Test branch based on test procedures developed by WHE Engineering. These procedures operationally test the brake at minimum and maximum conditions (torque, air gap, and lining thickness) to verify proper brake operation within the tolerance. Hoist brakes are tested with 125% rated test loads. Travel brakes are tested with 100% rated loads where engineering considers it significant. Documentation is provided to the WHE Test/Inspection branch, via Engineering approved brake data sheets, for incorporation into maintenance requirements cards and crane maintenance and inspection specifications documents.

Request a deviation from the Crane Alteration requirement for locally developed brake adjustment criteria.

Answer: Your request for a deviation from the requirements of NAVFAC P-307, paragraph 4.4.4 (i.e., not preparing and submitting Crane Alterations for establishment of brake adjustments outside the OEM limits, or where the OEM does not provide criteria, etc, to NCC) is partially disapproved.

As a result of your request, NCC revised present P-307 requirements to allow required alterations to be locally approved vice requiring NCC approval. The next revision to P-307 will reflect this change as follows:

"4.4.4 Crane Component Setting Adjustments. Adjusting component settings, such as brakes, within the OEM prescribes limits does not constitute an alteration. Adjustments using the OEM permitted replacement parts, such as stiffer brake springs, are locally approvable alterations. Establishing brake settings and tolerances outside of OEM limits (or where the OEM does not provide a setting tolerance) is a locally approvable alteration provided the activity engineering organization directs the development and testing of brake settings and tolerances."

Question: May BOS contractors use a program equivalent to that required by NAVFAC P-307, sections 2, 3, and 9 through 12 in lieu of the programs required by NAVFAC P-307 for maintenance, inspection, testing, certification, and operation.

Answer: Maintenance, inspection, testing, and certification of BOS-owned and operated contractor WHE must strictly adhere to the requirements set forth in NAVFAC P-307, sections 2 and 3. The certifying official, at the preference of the activity commanding officer, may be designated activity or contractor personnel. An equivalent program is not acceptable.

BOS contractor operations of Navy or contractor-owned WHE must be performed in accordance with the requirements of sections 9 through 12. An equivalent program is not acceptable.

Question: May BOS contractor personnel involved in the operation and management of WHE be trained, designated, and certified with an equivalent program meeting the requirements of NAVFAC P-307, sections 6 and 13.

Answer: BOS contractor personnel operating Navy or contractor-owned WHE must be licensed in accordance with the requirements of a contractor process, which is equivalent to the process, set forth in NAVFAC P-307, sections 6 through 8.

Training for BOS and other contractor personnel involved in the management of WHE personnel must meet the requirements of section 13, including the satisfactory completion of required training provided by NCC authorized training centers. An equivalent program is not acceptable.

Question: NAVFAC P-307, paragraph 1.9, allows for activity generated forms and allows activities to delete items that are not applicable to the subject crane. We have generated forms for the Crane Operator's Daily Checklist for category 2 and 3 cranes that have deleted the asterisk from the operating test area safety item. The

attribute for this inspection item (paragraph 9.1.2.1.4.a) states, "Area Safety. Check work area and ensure that the exact locations of obstacles or hazards are known. Ensure ground conditions are sufficiently firm to support a loaded crane." Since this Crane Operator's Daily Checklist is applicable to category 2 and 3 cranes, the second sentence has been deleted (the second sentence is applicable to truck cranes).

Since the condition of the ground to support a loaded crane is not a concern for category 2 and 3 cranes, an unsatisfactory condition observed during the area safety inspection will not immediately suspend all operations. Per the instructions on the Crane Operator's Daily Checklist (P-307, figure 9-1), since the operating test area safety item will not suspend all operations immediately upon observing an unsatisfactory condition, this item does not require an asterisk.

Request approval to remove the asterisk from the operating test area safety item, since the applicable inspection item for category 2 and 3 cranes does not require an asterisk as specified by the instruction on the Crane Operator's Daily Checklist (P-307, figure 9-1).

Answer: Your request to remove the asterisk from the area safety item is denied. NCC agrees that the second sentence of paragraph 9.1.2.1.4.a does not apply to category 2 and 3 cranes. However, the first sentence does apply. In the previous two fiscal years, there were over 100 load or crane collisions, which occurred during category 2 or 3 crane operations. The number of collisions would indicate that the area safety item on the ODCL requires additional attention. ■

NAVFAC P-307 REQUIRED TRAINING CHALLENGE EXAMS

NAVFAC P-307, section 13, requires Navy military and civilian personnel and service contractor personnel (BOS and other contractors) to complete specified training related to the particular job functions they perform related to weight handling equipment. In response to requests from several Navy activities, Navy Crane Center (NCC) will offer the following challenge exams to journeyman level crane personnel: crane mechanic, mobile crane mechanic, mechanical crane inspector, crane electrician, crane electrical inspector, crane rigger, rigging gear inspector, and load test director.

These exams are designed to determine if the candidate's level of knowledge is sufficient to allow him or her to continue working on Navy cranes without completing the required training. These exams are intended for personnel with specific trade knowledge related to the test to be taken and considerable experience with the Navy's crane program. Each exam contains NAVFAC P-307 related and trade related questions based on the course material from each class. The minimum passing score is 70 percent.

Each candidate must submit a request via e-mail to deckerdr@ncc.navfac.navy.mil from his or her first line supervisor. The request must include the name, address, e-mail, phone number, and a summary of experience of the person challenging and course(s) to be challenged. NCC will, by return e-mail, provide a test date and location. NCC authorized personnel will proctor the tests in Silverdale, WA; San Diego, CA; Pearl Harbor, HI; Portsmouth, NH; Lester, PA; Norfolk, VA; or other sites as warranted.

NCC headquarters' personnel will grade the tests. Test results and certificates, as appropriate, will be returned by mail within 30 days.

For more information on the challenge test contact Dave Decker (610) 595-0952 or DSN 443-0505, or deckerdr@ncc.navfac.navy.mil. ■

THE COMPLICATED SHACKLE

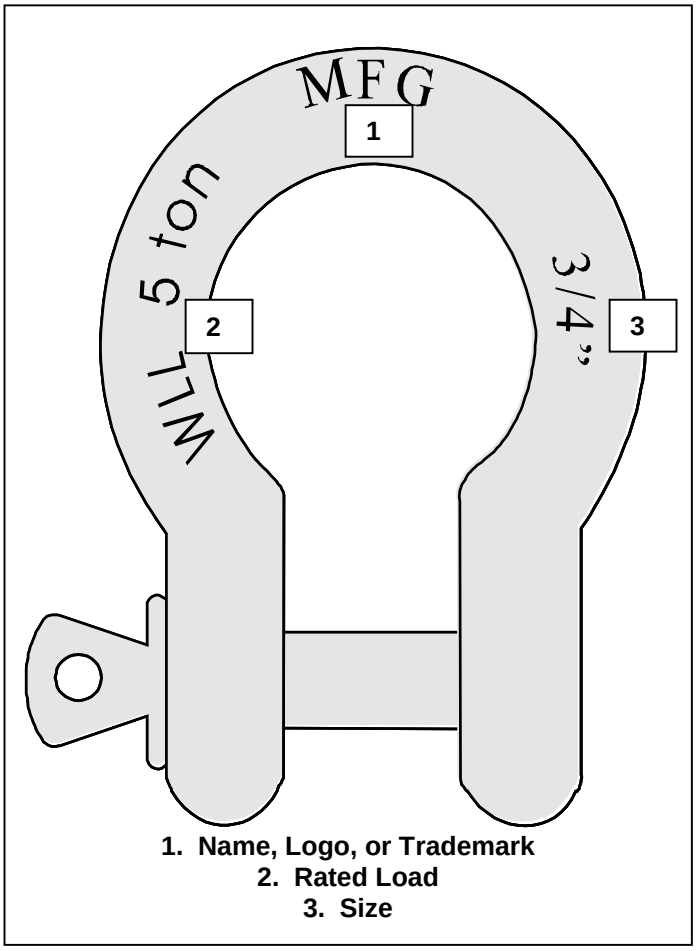
Bill Bass

When most people think of a shackle, what comes to mind is a simple piece of rigging gear, a U-shaped body with a pin. But there is more to shackles than meets the eye. The quality of a shackle, which relates directly to its strength, depends on how it is made and the material from which it is made. For instance, there are two grades of shackles common in the industry, grades A and B. Federal Specification RR-C-271D, Chain and Attachments, Welded and Weldless, identifies grade A shackles as "forged from carbon steel" and grade B shackles as "forged from alloy steel." Whether or not a shackle is heat-treated, also makes a huge difference in its strength as well as other characteristics. The type of heat treatment used on shackles affects such things as strength, ductility, and their fatigue and impact properties. There are many reliable companies that make shackles that meet, or exceed the requirements of Federal Specification RR-C-271D.

A shackle's rated load (also referred to as safe working load, working load limit, or capacity) is based on its ultimate strength. The industry standard for determining a shackle's rated load is to limit it to 20% of its ultimate breaking strength. This is often referred to as having a five-to-one (5:1) safety factor. (Although, some shackles are used at other percentages of ultimate breaking strength.)

With all this taken into consideration, it is not hard to understand that there are many shackles, of any given size, with a wide range of different rated loads. The problem with having like-size shackles with various rated loads available for use is the potential for mixing them in the same rigging configuration and then basing rigging calculations on the higher rated shackles. It is important to examine each shackle selected for use to ensure calculations are based on the lowest rated shackle.

Another problem occurred several years ago when the market was flooded with "no-name" shackles, shackles that had no manufacturer's name or logo marked on them. This also includes shackles that have a country's name (China, Korea, USA, etc.) on them but no manufacturer's name. Due to inadequate materials and/or processes, many of these shackles were failing at forces well below the normal rated loads for shackles of various sizes. The Navy banned the use of no-name shackles and began removing them from inventories of weight handling equipment; however, they are occasionally found in use during audits of naval activities. All activities should be alert for no-name shackles and ensure that they are not used in weight handling operations.



1. Name, Logo, or Trademark
2. Rated Load
3. Size

Another concern when using screw-pin shackles is whether or not to fully seat the shackle pin shoulder. It is a common rigging practice to screw the pin in until it seats, then back it off ¼ turn. This keeps the pin from binding in the body after making a heavy lift, but could also allow the pin to further loosen during use. The shoulder of the pin also supports the body during angular and side loads. Loosening the pin would result in a loss of side load capacity. If the pin is fully seated before making a heavy lift, it often requires a tool, such as a marlinspike, to initially break the pin loose so it can be unscrewed by hand. When using screw pin shackles, ensure the screw pin shoulder is fully seated against the body of the shackle.

One shackle manufacturer recommends seating the pin by hand and then adding additional torque by use of a tool when shackles are used in unloaded high vibration environments and cyclic loading environments where the load cycles from some upper limit to a completely slack condition. No shackle rotation is assumed.

Personnel at one activity raised concerns about traveling a mobile crane with a rigging configuration attached to the hook that includes shackles. In this situation, if the shackle pins are not tight, the possibility exists that a pin could work its way out and fall, potentially endangering personnel in the area. Unless some action is taken to ensure the shackle pins in a rigging configuration are secured from disassembly during crane travel, they should be removed from the hook before moving the crane.

This article covered only a few issues concerning shackles. There is much more information about the different types of shackles, their uses, their limitations, and the meaning of their different markings. People who perform rigging operations and use shackles of the various types should be aware of the requirements that apply to each of those types. ■